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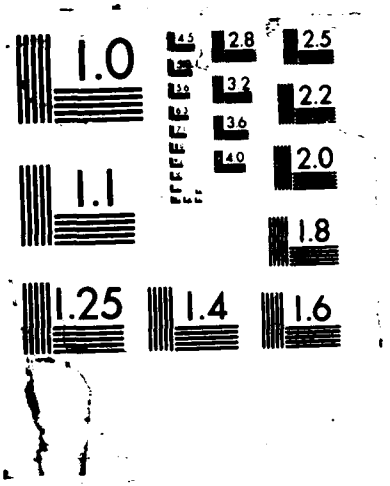
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1.1
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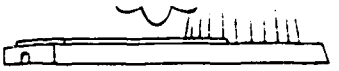

הוועדה לאנרגיה אטומית
המרכז למחקר גרעיני שלישורק





SSP-PR-40-253-87

# Growth of HgZnTe Layers by LPE Technique

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4th Period Report

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The goal of this project is to evaluate the LPE growth technique as a tool for preparing $Hg_{1-x}Zn_xTe$ suitable for photodetectors.

In the first year of this project optimization of the growth conditions was done.

The objective for the second year is to study the parameters which determine the trasport electrical properties of the $Hg_{1-x}Zn_xTe$ epilayers.

In this interim report we report the first results of annealing experiments on the epilayers and compare the characteristics of the annealed epilayers with those of the "as grown".

The "as grown" epilayers of $Hg_{1-x}Zn_xTe$, $0.15 \leq x \leq 0.24$, exhibit p type conductivity with carrier concentration of the order $1\times10^{17}/cm^3$. In order to decrease the carrier concentration down to the level of $1\times10^{16}$, the optimum carrier concentration for photodetectors, the epilayers were annealed in Hg atmosphere. The conditions of the annealing were similar to those which are generally used for the annealing of $Hg_{1-x}Cd_xTe$, namely, temperature of the sample around 400°C for several hours. About ten annealing experiments were done so far. Of the ten annealing experiments only three had successful results, decreasing the carrier concentration down to $1\times10^{16}/cm^3$. In all the other samples the carrier concentration remained as high as in the non-annealed samples. So far, no dependence was found between minor changes in the annealing conditions and the annealing results.

The characteristics of sample HZ85AN which are presented in table 1, represent results on the epilayers successfully annealed.

Keywords:
Mercury Compounds
Cadmium Tellurides

Table 1:

| Characteristic | "as grown" | Anealed |
|---|---|---|
| Thickness | 18μm | 18μm |
| Max. Transsmittance at 300K | 20% | 40% |
| Measured cut off at 300k | 6.1μm | 6.1μm |
| Estimated cut off at 80k | 9.5μm | 9.5μm |
| Carrier concentration at 80k | $1 \times 10^{17}/cm^3$ | $1 \times 10^{16}/cm^3$ |
| Hall mobility at 80k | $150 cm^2/V.sec$ | $300 cm^2/V.sec$ |
| FWHM | 100 arcsec | 100 arcsec |

It can be seen in table 1 that the carrier concentration decreased by an order of magnitude due to the annealing process. The other characteristics which should depend on the carrier concentration, namely the maximum transsmittance in the IR and the Hall mobility were also changed. The crystalline quality of the epilayer was found by measuring the full width at the half maximum (FWHM of the X Ray rocking curve). This parameter and the cut off were not influenced by the annealing process.

Further characterization of the annealed samples is underway.

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